Spot Safety Project Evaluation

Project Log # 200411161 Spot Safety Project # 07-97-019

Spot Safety Project Evaluation, of the Traffic Signal Installation and Additional Left Turn Lane, At the Intersection of SR 1742-Ephesus Church Road and Legion Road, in Chapel Hill, Orange County

Documents Prepared By:

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Spot Safety Project Evaluation Documentation

Subject Location

Evaluation of Spot Safety Project Number 07-97-019 – The Intersection of SR 1742-Ephesus Church Road and Legion Road, in Chapel Hill, Orange County

Introduction

In an attempt to assess the safety of our roads, the Safety Evaluation Group of the Traffic Safety Systems Management Section has evaluated the above project. The methodologies used in this evaluation offer various philosophies and ideas, in an effort to provide objective countermeasure crash reduction results. A naive before and after analysis and an Odds Ratio comparison analysis has been completed to measure the effectiveness of the spot safety improvement. This information is provided to you so the benefit or lack of benefit for this type of project can be recognized and utilized for future projects.

Project Information and Background from the Project File Folder

The spot safety project improvement countermeasures chosen for the subject location were the installation of a traffic signal and the construction of a left turn lane on SR 1742-Ephesus Church Road. Larry Goode, State Highway Administrator, originally requested the improvements. Legion Road is a two-lane facility at the intersection with SR 1742-Ephesus Church Road. SR 1742-Ephesus Church Road was a two-lane facility on both approaches to the subject intersection. Currently, SR 1742-Ephesus Church Road is a two-lane facility on the westbound approach and a two-lane facility with a left-turn lane on the eastbound approach. Prior to the spot safety improvements, the subject location was controlled by a stop sign on Legion Road. No accident history or problem statement was provided within the Spot Safety Justification Sheet. The final completion date for the improvement at the subject intersection was on January 23, 1998.

Comparison Analysis

After reviewing the spot safety project file folder along with all the crashes at the subject location, the crash data omitted from this analysis to consider for an adequate construction period was from December 1, 1997 through March 31, 1998. The before period consisted of reported crashes from March 1, 1992 through November 30, 1997 (5 Years, 9 Months) and the after period consisted of reported crashes from April 1, 1998 through December 31, 2003 (5 Years, 9 Months). The ending date for this analysis was determined by the available crash data at the time the crash analysis was completed.

The analysis also consisted of two different sets of data, the treatment and the comparison data. The treatment data consisted of all crashes within 150 feet of the subject intersection. The comparison data consisted of all crashes within 150 feet of the intersections of SR 1742-Ephesus Church Road and Long Leaf Drive, SR 1742-Ephesus Church Road and Tinkerbell Road, and SR 1742-Ephesus Church Road and Sharon Road-Pinehurst Drive. Please see attached *Location Map* for further detail. The following data table depicts the Naive Before and After Analysis for the treatment and comparison intersections. Please note that Frontal Impact Crashes were the target crashes for the applied countermeasure. The Frontal Impact Crash types considered are as follows: Left turn, same roadway; Left turn, different roadways; Right turn, same roadway; Right turn, different roadways; Head on; and Angle.

Treatment Information

| | Before | After | Percent Reduction (-)/ Percent Increase (+) |
|------------------------|--------|-------|--|
| Total Crashes | 20 | 10 | - 50.0 |
| Total Severity Index | 2.85 | 3.22 | 13.0 |
| Frontal Impact Crashes | 14 | 6 | - 57.1 |
| Frontal Severity Index | 2.06 | 2.23 | 8.3 |
| Volume | 12200 | 12500 | 2.5 |

Comparison Information

| | Before | After | Percent Reduction (-)/ Percent Increase (+) |
|------------------------|--------|-------|--|
| Total Crashes | 10 | 12 | 20.0 |
| Total Severity Index | 25.22 | 5.32 | - 78.9 |
| Frontal Impact Crashes | 7 | 5 | - 28.6 |
| Frontal Severity Index | 23.71 | 6.92 | - 70.8 |
| Volume | 6100 | 6600 | 8.2 |

Odds Ratio: Treatment versus Comparison

| | Before | After | Percent Reduction (-)/ Percent Increase (+) |
|-----------------------------------|--------|-------|--|
| Treatment Total Crashes | 20 | 10 | |
| Comparison Total Crashes | 10 | 12 | - 58.3 % |
| Treatment Frontal Impact Crashes | 14 | 6 | |
| Comparison Frontal Impact Crashes | 7 | 5 | - 40.0 % |

The naive before and after analysis at the treatment location resulted in a 50.0 percent decrease in Total Crashes, a 13.0 percent increase in the Total Severity Index, and a 2.5 percent increase in Average Daily Traffic (ADT). The comparison locations experienced a 20.0 percent increase in Total Crashes, a 78.9 percent decrease in the Total Severity Index, and an 8.2 percent increase in ADT. The before period ADT year was 1995 and the after period ADT year was 2001.

The Odds Ratio is used as another means of calculating the treatment effect. The number of crashes in the before and after period from the comparison locations are used to calculate the percent reduction in crashes for the Treatment Intersection. As shown in the previous table, using the Odds Ratio calculation, there is a 58.3 percent decrease in Total Treatment Intersection crashes and a 40.0 percent decrease in Frontal Impact Treatment Intersection crashes.

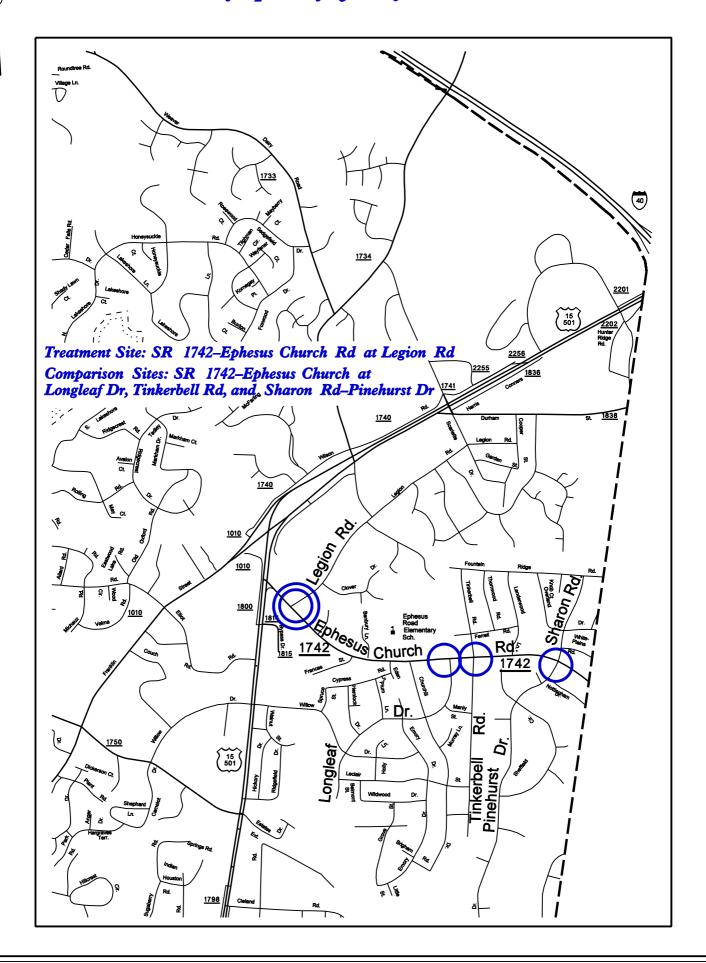
Results and Discussion

The naive before and after analysis involving the comparison of treatment actual before data versus treatment actual after data resulted in a 50.0 percent decrease in Total Crashes and a 57.1 percent decrease in Frontal Impact Crashes. Using the Odds Ratio to calculate the treatment effect resulted in a 58.3 percent decrease in Total Crashes and a 40.0 percent decrease in Frontal Impact Crashes at the Treatment Intersection.

The summary results above demonstrate that the treatment location appears to have had a substantial decrease in the number of Total and Frontal Impact Crashes from the before to the after period using both analysis methods. The countermeasure crash reduction for Total Crashes at the subject intersection can be in the range of a 50.0 percent decrease to a 58.3 percent decrease in crashes. The countermeasure crash reduction for Frontal Impact Crashes at the subject intersection can be in the range of a 40.0 percent decrease to a 57.1 percent decrease in crashes. As the Safety Evaluation Group completes additional spot safety reviews for this type of countermeasure, we will be able to provide objective and definite information regarding actual crash reduction factors.

Please see the attached Treatment Site Photos. Photos are provided for each leg of the intersection. Notice the Buy & Go Food Mart access points, Hamlin Park Apartments entrance, hotel entrances, and other PVAs within close proximity to the intersection. A large number of crashes have occurred at access points on SR 1742-Ephesus Church Road west of Legion Road (but not within the Treatment Area for this analysis).

Location Map, in Chapel Hill, Orange County Evaluation of Spot Safety Project Number 07-97-019



Treatment Site Photo (Taken on November 12, 2004)



Looking south on Legion Road



Looking south on Legion Road
Notice *Buy & Go Food Mart* in the northwest quadrant of the intersection

Treatment Site Photo (Taken on November 12, 2004)



Looking west on SR 1742-Ephesus Church Road



Another photo looking west on SR 1742-Ephesus Church Road Notice the left turn lane (built as part of the Spot Safety Project).

Treatment Site Photo (Taken on November 12, 2004)





Both Photos looking east on SR 1742-Ephesus Church Road

